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BIRD-BANDING

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Male Spotted Sandpiper and Young

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A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

VOL. I JANUARY, 1930 No. 1

GROWTH RATE OF THE SPOTTED SANDPIPER CHICK WITH NOTES ON NESTING HABITS[1]

(Photographs by Alfred O. Gross)

By THEODORA NELSON

THE following studies on the Spotted Sandpiper (*Actitis macularia*) were made at the Biological Station of the University of Michigan at Douglas Lake, Michigan, during the summer sessions of 1925–1929.

NEST AND EGGS

At Douglas Lake the Spotted Sandpiper is the commonest shorebird, as it is in many places. There has been an average of six nests for each summer found in the vicinity of the Station during June and July since 1925. The tract of land on which the Biological Station stands extends along the south and east shores of the lake. Here the shore is pure white sand from which shallow dunes arise, and it is back on these that the sandpipers nest chiefly, among the bracken ferns and blueberry bushes. The nest is a saucer-shaped depression lined with pine-needles and dried ferns, and usually protected by some small bush, tree, or fern. The clutch of eggs has been four in every nest observed and (characteristic of the *Limicolæ*) placed with their pointed ends in and down so that they fit into the nest with little waste space. The eggs are ovate with a very slight gloss. The ground color is vinaceous. They are irregularly spotted and blotched with rufous brown and chestnut. The average size of the eggs measured is 32 mm. by 23 mm.

[1] Contribution from the University of Michigan Biological Station. Read at the Philadelphia meeting of the American Ornithologists' Union, October, 1929.

BEHAVIOR AT THE NEST

Incubation and brooding are both done by the male bird alone. Six records of adults collected either on the nest or with downy young, support this assertion. In no case was there another adult present.

In June, 1928, several nests were under daily observation. One of these was built at the base of a small maple tree in front of one of the houses at camp and right beside the board walk to the mess hall. The nest was built and the four eggs were laid before any human arrived to disturb the beauty and serenity of the scene. At first only a handful of people came to open camp. This was alarming! Within two weeks these few had increased to some one hundred and fifty people passing along that sidewalk six times a day. For a wonder the bird did not desert his nest. One June 22d a blind was put up and pictures taken. Observations made from the blind at various times during the succeeding days showed the adult bird to be very restless and always alert. When flushed suddenly, he would leave the nest, flying toward the forest. When merely suspicious of approaching danger, he would run from the nest a short distance through the ferns and watch. While incubating he was particularly nervous, snapping at insects from the surrounding plants, continuously rearranging the pine-needles about the nest, or getting up and rolling the eggs about. Once he got some pitch on his bill and tried to wipe it off on the edge of the nest. This made matters worse, as pine-needles got stuck in it. Once he stood up and turned the eggs end over end instead of rolling them. When it came time for the eggs to hatch, the adult was absent from the nest for shorter periods of time. Often as he approached at this time he would call softly, "Hurrrweeee, hurrrweeeee, hurrrweeee". During the rain the bird stayed at the nest almost constantly, sitting low over the eggs. He continually pecked at the raindrops on the surrounding sticks and leaves.

Anxious to find whether it was always the same bird which brooded, the author determined to mark the adults under observation. A box trap was used, the framework of which, made of laths, was about 2x2x3 feet and was covered with a dull green cheesecloth. The bottom of the box was open. A window about 8 inches square was cut through the cloth of one side, and over this was fastened a curtain slightly larger than the opening. This was sewed down securely on two adjacent sides, but free on the other two in order to permit reaching in and getting the trapped bird. The trap was set over the nest and held up at one corner by a stick to which a

ADULT MALE SPOTTED SANDPIPER ON NEST

PLATE I

string was fastened. The string led into the blind. The adult birds differed in their reactions to this trap. Some paid little attention, while others walked around it a number of times before they would go beneath and sit upon the eggs. All of the adults did enter finally, and when they were thoroughly settled, the stick was pulled out and the trap dropped over them. Fluttering against the soft cloth sides did not hurt them, and they could be reached through the window and a leg-band put in place with little trouble. When released, they always left flying toward the lake, crying piteously their "peet-weet" alarm-call. Just as soon as they were gone, the trap was moved out of sight of the nest. The birds usually returned within a half-hour. The leg-band was not easy to see when the birds were walking through the brush, so they were marked further. This was done by using different-colored paints. Red was used with success on one individual. A number of pine-needles were dipped in very thick paint and placed around the edge of the nest. The bird sat on these and arose with a beautiful rosy breast and under tail-coverts. As soon as the sandpiper was marked, all evidence of the paint was removed so that no other bird might be marked likewise. This color on the breast feathers showed fairly well at night when the author by the aid of a flashlight investigated the nest to see whether the incubating bird was the same as the one seen during the day.

Another nest was a mile down the lake and about fifty feet back from the water's edge. Since it had been discovered before the last egg was laid, it was a very important nest. As it was desired to mark this adult also, green paint was used on three little strips of absorbent cotton placed about the edge of the nest. When the bird returned and saw that his nest was thus decorated, he gave a sharp cry and, picking up the first piece of cotton, flew with it to the forest. He returned at once and, taking the second piece, carried it into the grass. He ran back for the third and, carrying it to the second, picked up both, crying all the while, and flew away with them. Not wishing to tease the bird, the paint question was pressed no farther. This adult sandpiper was far shyer than the others under observation and very, very easily disturbed. It was concluded that this was his first nest.

HATCHING AND CARE OF YOUNG

To return to the nest by the Mess Hall sidewalk: June 27th, the first little chick hatched out prematurely. On coming to the blind, the author found the chick with eyes not open, the

NEST OF THE SPOTTED SANDPIPER SHOWING FOUR EGGS IN TYPICAL POSITION

down dry and hard and with much shell adhering. He was lying on the ground beside the nest kicking feebly. The adult was gone but returned very soon. He settled down well over the three remaining eggs, clucking softly. He remained quiet for a few seconds and then took a pine-needle in his bill and threw it over to one side. All at once he seemed to discover the little one outside of the nest, for he stood up, reached forward, and pecked at the shell. A large piece became detached. He flew with this at once, going inland first, then turning, and, dropping the shell on the beach, he came running back to the nest. He settled down over the eggs and remained quiet for about two seconds and then noticed the squirming chick. He did not stand this time but, reaching forward, pecked at the chick's foot. The peck was vigorous, but the response very weak. Then the adult stood up and, carefully gathering up chick, shell, and all, flew away with them. It was impossible to see where he dropped his burden, nor did it come to light even after much searching. The old sandpiper returned, calling softly as he ran through the ferns, and settled down over the three eggs. That night the eggs hatched out, and by breakfast time the next morning all three chicks were strong enough to run about and peck at the leaves and raindrops and of course stop every once in a while and teeter up and down the way their father did. The old bird led his chicks away from the nest just as soon as they were able to travel. They would progress about a foot or two, and then the parent would hover them, with many interruptions from the people passing by. The chicks were banded before they had gotten very far from the nest. By evening they were one hundred and forty paces away from their nest, and in this territory they spent the remainder of the summer, a wonderful place for sandpipers because a jagged root jutted out where the adult might perch and watch for coming danger. Beneath him the waves had washed natural caves in the bank, and here the young lived and grew up. This parent stayed with his young until they were three weeks old.

The father sandpiper is always on the alert and takes good care of his chicks. While they are very small he hovers them frequently. The chicks are delicate, feeling extremes of heat, cold, and moisture very much. When one chick is weaker than the others, the parent will go to him and hover him, making the stronger little birds come to them. A parent sandpiper was observed to jump into a shallow hole where a chick had fallen and could not get out, and seemingly wrap his wing about the little one, giving that soft "hurrrweeee-hurrweeee"

NEWLY HATCHED CHICKS IN NEST AMONG THE GRASSES AND SEDGES
Note the round head and short bill of the chick at this age

NEWLY HATCHED SANDPIPER CHICKS
The one at the extreme left has just come out of the shell

call, never showing impatience at its weakness. On the other hand the parent has been seen to peck a slow little chick to make him hurry when the rest of the brood were under the protecting wings. When it rains at night, the adult scoops out a nest-shaped cavity and hovers the young in this, the topmost chick when flattened out not being above the surface of the ground. The adults do not bring food to the young. The food is insects, snails, and small worms. One juvenile, two weeks old, ate a quantity of *Tubifiscidæ* when he was in the laboratory being measured. The young sandpipers are very difficult to keep in captivity; in fact they frequently die over one night. Therefore, if a series of measurements are being made on the same birds, it is essential that they be either measured in the field or returned from the laboratory as soon as possible. In the course of the summer the students brought in numbers of young chicks picked up at various points around the lake-shore. Having had one fatality after another in trying to act as parental sandpiper, the author determined to return the young to some near-by parent for adoption. The results have been much the same in all cases. The young birds brought to their foster father at night would be accepted without question, the wing being spread out a little farther to accommodate them. On one occasion the foster chick was very weak from being in the laboratory too long, and could not run to the adult. He left his own brood and went to this one, calling the others to follow.

Distinct territory rights have been observed in several cases. The adult of the Mess Hall nest commanded a given area, which as the young grew older he extended down the beach for about a quarter of a mile, to a point where the lake meets the high ground. As the juvenile birds learned to fly, he would go parallel to them along the high ground, while they ran at the water's edge feeding and making short flights out over the water. Other parent sandpipers have been observed raising their young on the same territory apparently without any difficulties.

The nest with the incomplete clutch of eggs was discovered on June 26th. On June 27th the fourth egg was laid. In the morning of July 18th the eggs hatched; the first at 4.30, the second at 6.00, the third at 6.40, and the last at 9.15. This gives an incubation period of 21 days.[1]

[1]Bent, A. C. *U. S. Nat. Mus. Bul.* No. 146, p. 84, gives the incubation period as fifteen days. Another nest observed in 1925 and found with a complete set of eggs hatched nineteen days after discovery.

DOWNY YOUNG "93886," AGE THREE DAYS

DOWNY YOUNG "93886," AGE ONE WEEK
Note that the primaries are growing out and beginning to unsheathe

GROWTH-RATE AND MEASUREMENTS

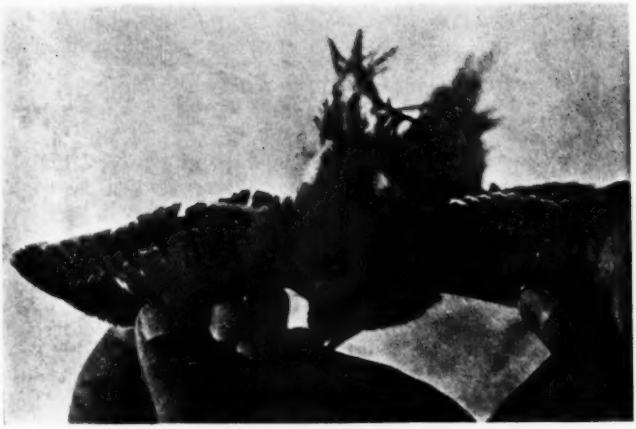
Whenever possible the chicks were banded just as soon as they hatched. Thus their age was definitely recorded and they could be recognized when caught for measuring. Several of the more general measurements are given in the accompanying tables. In these the serial number on the band is given at the top of each column along with the age of that particular individual. It will be seen that the same individual was seldom caught on two consecutive days. Therefore the plotted growth-curves are compilations of the measurements of as many young sandpipers as could be obtained, and the curves are smoothed for individual variations and sexual differentiations. In general the bill increases in length an average of 1 mm. a day for the first fifteen days. Along with this the skull changes markedly from the round infant head to the elongate adult. The primaries are the first to appear and unsheathe. These are followed closely by the secondaries, scapulars, and tail feathers. The entire ventral surface and the crown of the head follow. At two weeks we have juvenal plumage on all but the sides of the head, entire neck, back, and flanks. By the tenth day the juvenile bird is using his wings, although he does not raise himself from the ground. By the sixteenth day he can fly short distances, although inclined to use his legs rather than his wings when pursued. The chicks swim well and are inclined to take to the water and dive under when all other means of escape have been cut off.

Measurements of a chick of unknown age may be placed against those obtained from birds whose age is known, and the approximate age of the former obtained.

DESCRIPTION OF PLUMAGES

Downy young, one day old: Bill deep mouse gray tipped with lighter. Tarsus and toes light mouse gray, unfeathered portion of flanks and tarsus spotted with dark brown. Nails dark neutral gray tipped with lighter. Entire under parts white. Upper parts drab to drab-gray, mottled with black. Conspicuous median line of black. Black line through the eye back to region of the nape. Iris, dark clove brown.

Young, two weeks old: Down on center of crown replaced by juvenal plumage. Juvenal plumage unsheathed on ventral side showing pectoral gray bands. Wings and wing-coverts unsheathed and entirely replacing natal down. Sides of head, margin of crown, entire back, and tips of the tail feathers with down still a conspicuous part of the plumage. In general the upper parts are of the same color as in the adult plumage, an



"93886," AGE TWO WEEKS
Shows development of juvenal plumage

NEST AT THE BASE OF YOUNG MAPLE TREE
showing the surrounding vegetation—blueberry bushes, wild false lily-of-the-valley, and bracken ferns

olive with brownish tinges. These scapulars and upper tail-coverts are tipped with a conspicuous band of ochraceous buff.

EXPLANATION OF MEASUREMENTS FURNISHING DATA FOR GRAPHS

Length—Tip of bill to tip of down on tail.

Tail with down—Base of uropygial gland to tip of down.

Bill—Tip of bill to base of forehead where down begins.

Extent—Wing-tip to wing-tip; out to tip of down and later to tip of longest primary.

Tarsus-toe—From tibio-tarsal joint to tip of nail of third toe.

Wing—Distal third, that is from the bend of the wing to tip of either down or primary as the case may be.

Weights and measurements of the four chicks pictured on the cover, averaging 4 hours old, July 12, 1928.

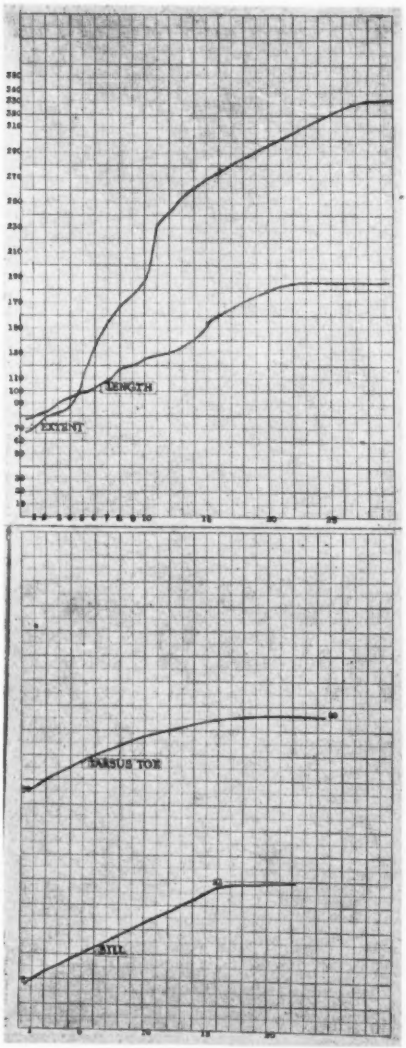
This table of measurements demonstrates the individual variations in one brood of chicks:

	188344	188345	188341	188347
Weight	6.7 gm.	7.1	7.4	7.4
Length	80 mm.	83	76	83
Tail with down	26	24	26	22
Bill	8	9	9	9
Extent	70	67	67	65
Right wing	21	21	17	20
Tarsus-toe	44	44	44	43

MEASUREMENTS OF SPOTTED SANDPIPER CHICKS

Age	*Newly Hatched*		1 *Day*		2 *Days*		3 *Days*		4 *Days*	5 *Days*	6 *Days*	
Band Nos.	188347	188341	426484	188341	188347	93885	93886	93887	188347	188341	696257	93887
Weight (grams)	7.4		6	6.1		7.6	8.2	7.8	8.8	10.6		
Length (mm.)	83	76	77	85	95	94	97	99	103	102	109	105
Tail with down	22	26	18	27	30	23			30	27	30	30
Bill	9	9	9	9	11	6	11	12	12	12.5	14	14.5
Extent	65	67	70	65	80	79	85	82	87	110	135	
Right wing	20	17	16	22		20	17	18	20	27	31	32
Tarsus-toe	43	44	38	41	40	44	42	46	44	46	42	45

Age	7 *Days*		8 *Days*	9 *Days*	10 *Days*	11 *Days*	12 *Days*	13 *Days*	14 *Days*	16 *Days*	21 *Days*
Band Nos.	93886	93885	93885	93886				188344	93886	188344	
Weight (grams	15.1			17							
Length (mm.)	118	105	115	120	125	130	140	155	125	160	
Tail with down	32	28	28	33	32	35	44	45	40	.	55
Bill	15	15	16	17	18	18	20	20	18	19	21
Extent	154		167	175	186	237	254	241	232	269	
Right wing	35	35	41	55	46	68	74	68	65	77	87
Tarsus-toe	46			46.5	44		50	50	48	50	



Upper Graph, Growth Curves of Length and Extent
Lower Graph, Growth Curves of Tarsus Toe and Bill
(Graphs not on same scale)

SUGGESTIONS FOR A REVISED BIRD-BANDING TERMINOLOGY[1]

By MABEL GILLESPIE

THE object of bird-banding is to obtain sufficient data over a period of years to furnish answers, in part at least, to many ornithological problems. In order to make correct interpretations of an accumulation of data, the facts should be arranged as systematically as possible. A terminology, therefore, should be based primarily on the facts of greatest importance, and the same name should in every case be given to occurrences of *like ornithological significance*.

The terms "repeat" and "return" are in common use by individual bird-banders, in the publications of the various associations, and by the Bird-Banding Department of the Bureau of Biological Survey; but they are used with different meanings in many instances.

According to the Biological Survey, repeat is used to refer to birds that "repeatedly return to a trap."[2] "The term 'repeat' is used to designate a short-time return at the original station. It is used in case of recoveries of banded birds that have apparently not been absent from the immediate neighborhood since the time they were last handled. . . . Sedentary species may perhaps repeat continually throughout the year."[3]

"By 'return' is meant the record of any banded bird recovered in a succeeding season, or the record of any bird termi-

[1] At the meeting of the American Ornithologists' Union in October, 1929, at Philadelphia, the author read a paper entitled "Some Theories Regarding Returns of Banded Birds." An introductory paragraph stated the difficulty that had arisen in attempting to analyze results because of the present inadequacy of bird-banding terminology. Some terms commonly employed by the author and Mr. J. A. Gillespie were used in this paper to distinguish between various kinds of returns. Discussion, following the reading of the above-mentioned paper, concerning the inadequacy of bird-banding terminology, has encouraged the author to elaborate her criticism of the terminology into a paper of constructive suggestions, which is herewith presented for the consideration and criticism of bird-banders.

[Since this article went to press there has appeared the U. S. Dept. Agri. Misc. Publication No. 58, "Manual for Bird Banders," by F. C. Lincoln and S. P. Baldwin. The definition of repeat on page 100 is essentially the same as the one quoted above. The definition of return on page 101 is worded so as to include birds taken during a given season at different points on the migration route, but is not otherwise essentially different from the definition of return above quoted.]

[2] *Annual Report of the Smithsonian Institution*, 1927, *Bird-Banding in America*, F. C Lincoln, page 337.

[3] *Instructions for Banding Birds*, F. C. Lincoln, 1924, U. S. *Dept. Agri. Misc. Circular*, No. 18, page 25.

nated by its death."[4] "Return" has, accordingly, these interpretations: 1, the retaking of a bird at the original banding station after an interval of several months, during which interval the bird has presumably migrated; 2, the finding of a banded bird dead at the orginal banding station regardless of the interval that has elapsed since the date of banding; 3, the taking of a banded bird alive at some other point than the original banding station during a succeeding season; 4, the finding of a banded bird dead at some other point than the original banding station at any time. However, the Biological Survey classifies also as returns birds taken during a given season at different points on the migration route, such as the Purple Finch (*Carpodacus p. purpureus*) banded at Groton, Mass., May 6, 1929, and taken thirteen days later at Bar Harbor, Maine.[5]

The *Bulletin of the Northeastern Bird-Banding Association* uses the word "return" as applied "to birds which, banded at one station, are retaken at the same station after having returned from an annual migration or migrations for the first time."[6] The convenient notations "return-1," "return-2," etc., refer to banded birds returning (according to above quoted definition) for the first and second recorded seasons following original season of banding.

The use of the word "recovery," also sanctioned by this *Bulletin*, is fairly common among bird-banders, though not in use by the Biological Survey. This word is used to indicate birds retaken elsewhere than at the original banding station.[7] The Purple Finch previously mentioned was referred to as a recovery in the *Bulletin*.

Thus it is evident that confusion exists because of the varied usage and inadequacy of definition. It is impossible for the individual bird-bander to use or understand loosely (and sometimes contradictorily) defined terms intelligibly. The difficulty confronts him both in attempting to analyze his own records and in endeavoring to communicate his results to others in adequate, comprehensible phraseology.

Further problems have arisen that have greatly handicapped any attempt at studying an accumulation of data, because like

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[4] *Annual Report of the Smithsonian Institution*, 1927, *Bird-Banding in America*, F. C. Lincoln, page 337.

[5] *Bulletin of the Northeastern Bird-Banding Association*, Vol. V, Oct., 1929, page 160.

[6] *The Auk*, Vol. XLI, April, 1924, page 329, *Further Observations on the Group Habit among Birds*, C. L. Whittle and L. B. Fletcher.

[7] *The Auk*, *loc. cit.*, page 333.

phenomena have not been grouped under appropriate names. The bird-bander is apt to overlook the meaning or ornithological significance of his data because of the confusion in grouping. Such confusion is inevitable because the terms are defined largely through usage and the usage varies according to individual ideas.

Typical difficulties are illustrated by the following records (J. A. and M. Gillespie, Glenolden, Pa.):

		Banded	*Trapped*	*Found dead at station*
61233	Song Sparrow	Dec. 23, '22		Jan. 7, '23
61224	White-throated Sparrow	Nov. 26, '22	Jan. 6, '24	Oct. 30, '24

The Song Sparrow (*Melospiza m. melodia*) figured in one winter season only, while the White-throated Sparrow (*Zonotrichia albicollis*) returned for the second season after first being banded. If both birds had continued to live, the former would be called a repeat and the latter a return. And yet, because found dead, they have both been classed alike as returns. Death concludes the record of a bird, to be sure, but it does not alter the fact of a repeat or return, either of which may be of great importance.

Consider the case of a Junco (*Junco h. hyemalis*), for example, banded by a coöperator on a certain date during the winter season, and found dead a few weeks later by a neighbor several hundred feet from the original trapping station. The Biological Survey calls such a case a return, the *Bulletin of the N. E. B. B. A.* calls it a recovery; but should it not really be a repeat? Are the facts either of death or human identity of particular importance? What should be emphasized in this connection is the fact that the important item is the finding of the bird within a certain locality at a certain time, and that the identity of the capturer does not matter, nor, in most cases, the fact as to whether the bird is dead or alive. In considering migration problems, the important facts about the movements of birds are concerned with time and place.

When two banders, *A* and *B*, are operating stations near enough to each other so that birds would roam from one to the other in the course of normal daily activity, then a bird banded by *A* one season and taken by *B* during that season is actually a repeat. If taken by *B* during a succeeding season, the bird is actually a return scientifically considered.

Numerous complications in the matter of terminology arise in the case of a species some of whose members in any given banding area are successively present as winter residents, summer residents, and migrating visitors during the short period

of spring or fall migrations, and others continuously present as permanent residents. At our station in Glenolden we have had Song Sparrows that spent the winter and left in the spring, Song Sparrows that nested and left for the winter, Song Sparrows that passed through in the spring, and several Song Sparrows that remained through the greater part of an entire year. Birds of the last type are not returns, though they have been so listed if not trapped frequently. The other examples are (where birds return during successive seasons) returns to summer areas, to winter areas, and definite halts on the migration route. The term return is vague when covering all of these possibilities, since the significance in each case is different.

In proposing certain changes in and additions to the banding terminology, the definition of repeat remains very much the same. A repeat is a bird retaken at or in the *near* vicinity of the original banding station during the sedentary (seasonal) or non-migratory interval following the first capture or that of any return. The time cannot be arbitrarily limited, since it varies with different species and during different seasons. In the case of permanent residents, recaptures should be classed under repeats, even if an interval of a year elapses between captures. To illustrate this point, there is the case of a male Cardinal (*Cardinalis c. cardinalis*) that fights daily with its image in the window of a garage, and whose band can be clearly seen. This bird was banded in January, 1928, was retaken in February, March, and May, and then not again until May, 1929, although the bird was seen almost every day. The fact that the bird is trap-shy does not alter the fact that it has never migrated.

A banded migratory bird found dead at the station where it was banded during a seasonal non-migratory interval should be classed as a repeat. Continued repeats are valuable in indicating the duration of seasonal residence, and it is the fact that a bird is still present at a certain date that is important, not that it was found dead.

For the sake of convenience in writing one's daily banding journal and in filing, repeats taken by a neighbor or coöperator on adjoining territory may be referred to as "recovery repeats," and *vice versa*. "Return repeats" are birds already taken as returns that subsequently repeat during the season of return. There will occasionally be "sight repeats," birds recognized by manner of banding (colored bands, etc.) or by some physical characteristic (albinism or peculiar habit, etc.). In rare cases originality of song may indicate a "song repeat."

A return should be just what the word signifies, a return to

the same area after a period of migration. Returns fall naturally into four classes: "summer resident returns," "winter resident returns," and "spring and fall *migrating* returns." The latter indicate migrating returns going north (spring migrants) and migrating returns going south (fall migrants). These four classes of returns may be further defined as "recovery returns" (returns taken by a neighbor), sight returns, and song returns.

Of particular value is the terminology of the *Bulletin of the Northeastern Bird-Banding Association* for indicating the time element with returns. Thus a bird that returns to its summer habitat for the third consecutive season after first being banded may be referred to as a "summer return-3," or "R-3 S." (A return to winter habitat would similarly be a "winter return-3," or "R-3 W.") If it happens that such a bird was banded one year, retaken the next, not taken the third year, and then taken the fourth, the probability is that it was present but not trapped during the third year. Calling such a bird a return-2 rather confuses the actual facts since it belies the time element. However, the bird can be called a return-3 with an explanatory note, or the notation may be as follows, "return-3 (-1)," thus indicating a season when not taken. Birds taken as returns on the north or south migration journey may be indicated as "returns migrating north or south." The abbreviations "R-1 M-S" or "R-1 M-N" will be of convenience. Death in no way affects the ornithological significance of a return.

Repeats and returns thus apply to birds retaken at or very near the original place of banding. For birds that are retaken away from the vicinity of the original banding station, dead or alive, the term recovery is appropriate. If such recoveries of an individual continue during successive years, migration having taken place in each case, the number of years of recovery may be indicated as in the case of returns. A Purple Finch banded at Middleborough, Mass., on Jan. 26, 1924, was taken during the five succeeding years at Cohasset, Mass., and is called a "recovery-5."[1]

In the use of this terminology, remember that time and place of recapture determine whether a bird is a repeat, a return, or a recovery. Use these words as nouns in describing a given bird, and then add qualifying words or symbols when necessary to indicate season, etc. For individual use a good part of

[1] *Bulletin N. E. B. B. A.*, Vol. IV, April, 1928, page 71.

a bird's history may be conveniently indicated by abbreviated annotation.

These proposed changes and additions do not in any way limit the future necessary growth of our bird-banding vocabulary. Repeat, return, and recovery will continue to be the main divisions of classification, no matter how much each group may be subdivided. For bird-banders who are handling small numbers of birds and who are not engaged in special ornithological studies these three terms may be sufficient. But for an accurate analysis of records and for scientific writing, finer distinctions must be used. With these three logically defined divisions as a foundation for classification it is hoped that future needs, as yet undreamed of, may be met without again upsetting our bird-banding terminology.

SUMMARY

Repeat—a bird retaken at or in the near vicinity of the original banding station during the sedentary (seasonal) or non-migratory interval following the first capture or that of any return.

Return—a bird retaken at or in the near vicinity of the original banding station after a period of migration.

Recovery—a bird retaken away from the vicinity of the original banding station.

Terms	*Abbreviations*
REPEATS	
Repeats	Rep.
Permanent resident repeats	P. R. Rep.
Recovery repeats	Rec. Rep.
Return repeats	Ret. Rep.
Sight Repeats	St. Rep.
Song Repeats	Song Rep.
RETURNS (Numerals indicating number of years bird has returned)	
Summer (resident) returns-1	R-1 S
Winter (resident) returns-1	R-1 W
Returns-1 migrating north	R-1 M-N
Returns-1 migrating south	R-1 M-S
Recovery returns	Rec. R-1 (S, W, M-N, M-S)
Sight returns-1	St. R-1 (S, W, M-N, M-S)
Song returns-1	Song R-1 (S, W, M-N, M-S)
RECOVERIES	
Recovery-1	Rec.-1
Recovery-1 migrating north	Rec.-1 M-N
Recovery-1 migrating south	Rec.-1 M-S

Glenolden, Pa., December 15, 1929.

THE STATISTICAL TRENDS OF BANDING

By O. L. AUSTIN, JR., and J. M. DALLAVALLE

THE purpose and value of banding are not in putting bands on the greatest possible number of birds or of species; nor are the pleasure and glory of banding in marking the bird that flies the farthest or lives the longest. While these are of vital interest and consideration to the bander, the ultimate goal lies in the stimulation of our forces of reasoning and the advancement of knowledge. Ever since the official beginning of organized bird-banding on this continent in 1920, we have been amassing data concerning the movements of birds, but as yet comparatively few attempts have been made to utilize these data and to extract from them the full degree of their value. It is not so much the purpose of this paper to show how these results may be interpreted—the necessary technique may be found in any standard work on the theory of statistics—as it is to show some of the probable developments in banding in the near future as indicated by the data at hand.

One of the first things that becomes evident after data have been accumulated over a period of years is "trend." Though organized banding has now continued in North America for nine years, the number of data is not so great as would be expected; and though the data now have statistical significance, the element of chance still enters to some degree. Were the data more numerous, our results would be more accurate, but we must content ourselves with what we have on hand. Statistics, as such, are dependent on the number, quality, and interpretation of data. Number adds greater weight to probabilities and removes fluctuations. By quality we mean the degree of selectivity of choice offered by the data, whereby they lend themselves to association and correlation. Interpretation is the judgment of the attributes concerned, and, given the data, it is the most important consideration by far, for on it hinges the entire worth of the figures. The bander must know his bird, and in the final estimate interpretation is neither less nor more than ordinary common sense.

We have enough data at hand at present to allow us to make certain predictions concerning future banding. Let us take, for example, the data showing the total numbers of juvenal Common and Roseate Terns banded yearly at Tern Island, Chatham, Mass., for the past eight years, and see what we can deduce from them, using statistical methods. These data were furnished by Charles B. Floyd, who did by far the greater part

of the banding, and Mrs. Alice B. Harrington, who obtained the figures on birds banded by others on the island from the files of the Northeastern Bird-Banding Association. The most satisfactory method of showing data of any kind is by means of a histogram, which consists simply of pillars drawn to scale according to the data. The advantage of this method over a tabular structure is that it gives at a glance the whole history of the case, and allows one to form a mental picture of it. Not only does it show a trend effect at once, if there is one, but it also gives a relative comparison of one year to another. It is a highly efficient way of presenting data and can be relied upon to give far more effect in most instances than ordinary tables. (See Fig. 1.)

We note at once from this figure that the numbers banded in 1922 and 1923 were small and haphazard, and that they increase in a regular sigmoid or S-shaped curve up to 1928, to drop again slightly in 1929. We may interpret the curve in the light of our experience to understand the causes. In the earlier days of this banding it was an unorganized, hit-or-miss procedure. No plans were made ahead of time, and no one person, armed with sufficient bands and a knowledge of when

FIGURE 1

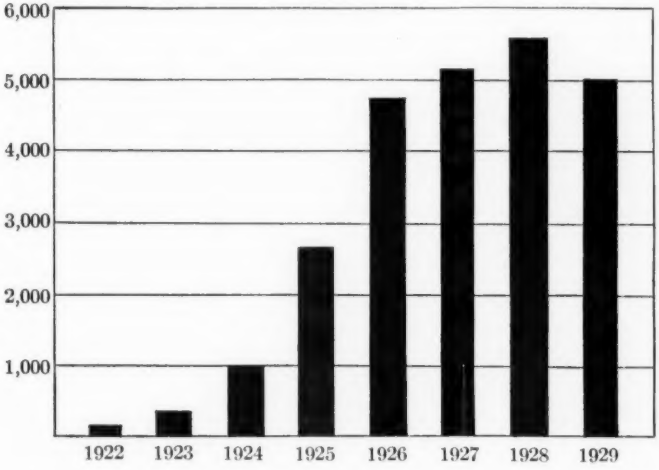


FIGURE 1 shows the total numbers of juvenal Common and Roseate Terns banded yearly at Tern Island, Chatham, Mass., during the past eight seasons.

most of the young would be ready to band, made it his business to see that the work was carried on. Then in 1924 Charles B. Floyd took a hand and organized it, with noteworthy results. It became a matter of knowing when to visit the island to band the maximum of young birds during the limited number of days the operators could spend at the rookery, and the numbers banded logically increased as those in charge became more experienced. But a limit has to be reached in all things, and it stands to reason in this case that we cannot band more young birds than grow to maturity on the island. We can do that only if we reach absolute perfection, which is highly improbable on a stretch of land the size of Tern Island and offering so much cover to so many birds. What we shall do is reach a stage where we band by our perfected methods a certain high percentage, which we may safely estimate here at about 75 per cent of the birds available, and we may call this number the saturation point. We are assuming, of course, that the number of young terns raised yearly on the island remains constant, which it does not exactly, but enough to be eliminated from our considerations. Of far more importance as variables are the number of banders who can lend a hand with the work each year and the amount of time they can spend on the island. From the histogram we see that a peak was reached in 1928, and that the banding in 1929 fell considerably below that number. There was considerably less time spent on the island by the banders in 1929 than during either 1927 or 1928, and the banding was started a trifle late, when many of the young were already on the wing. Thus we can estimate from the curve shown in the histogram, coupling it with our experience, that we may be able in future years, employing the same banding methods, to band slightly more birds than the highest peak yet reached. We may also arrive at this by a somewhat more roundabout method of reasoning. We have estimated that there are about 12,000 eggs laid on the island,[1] and that there is a mortality rate on the island from the time the eggs are laid until the young are able to fly of roughly 30 per cent. Hence, theoretically, about 8400 young birds comprise the yearly crop. If we reach our estimated efficiency of 75 per cent, we should band about 6300 juvenal birds yearly, which appears to be very logical.

In order to clarify the figures and to show this more definitely, we may plot the data on what is known as the logistic

[1] See Austin, O. L., Jr., "Contributions to the Knowledge of the Cape Cod *Sterninae*," *Bull. N. E. B. B. A.*, Vol. V, 1929, pages 123–140.

FIGURE 2

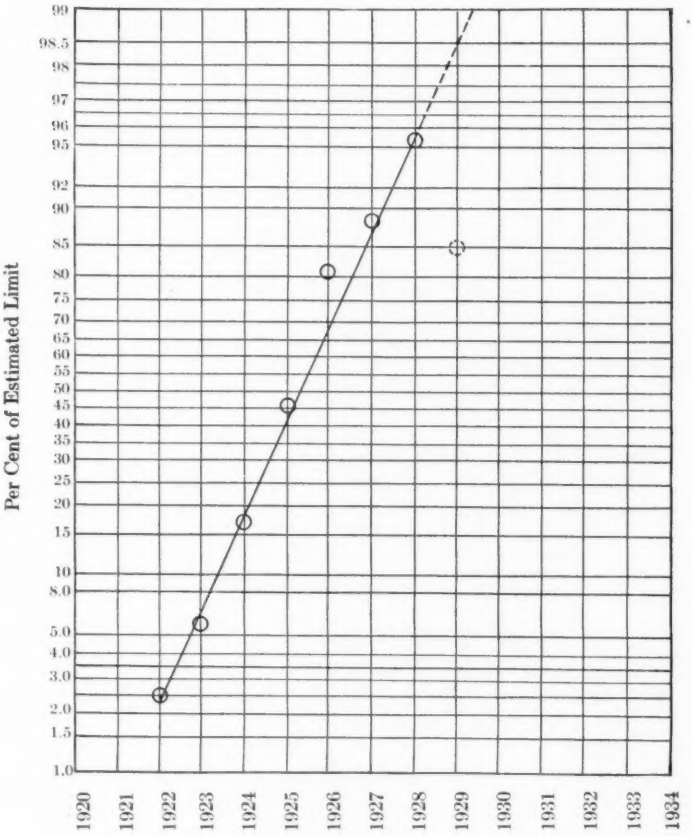


FIGURE 2 shows the data of Figure 1 plotted on logistic grid. The vertical scale is in per cent of an estimated limit, in this case 5900.

grid. This is merely a coördinate paper which turns an S-shaped curve into a straight line. It is a convenient and accurate method of estimating certain types of trends, for a straight line may be continued indefinitely into the future, where a curve may not be plotted with surety beyond the limits of the data at hand. We will not attempt to discuss the mathematics of this grid paper except to explain a few of its properties.[2] It is convenient mathematically to obtain the parameters of the equation, $y = \frac{L}{1 + e^{-n(t-t_o)}}$ where y is the number banded per year, L is the saturation point, t is the year, e is the base of the Napierian system of logarithms and is equal to 2.718 . . . , and n and t_o are the parameters of the equation which represents our sigmoid curve. This curve occurs most frequently in chemistry, where it is especially concerned with the rate of certain reactions. It has also been used recently by Yule and Pearl in their population studies. Wilson (*loc. cit.*) used the grid to predict the growth of scarlet fever and the ultimate saturation point of the population of the area fed by the Boston Metropolitan Water Supply. It must be understood, however, that the logistic grid will not rectify every curve of a sigmoid character, but only those for which the general equation will apply, as it does to the case in point.

The method of testing for a fit on this type of grid has been shown by Wilson (*loc. cit.*) and is very simple. From the alignment of the previous data, a saturation value is estimated. Each datum is then divided by this estimated number and plotted as a per cent saturation on the ordinate against the year on the abscissa. The estimate is repeated and retried until as nearly a perfect fit as possible is obtained on the grid. In the case of the data for Tern Island (see Fig. 2) 5900 birds yearly seems to be the ultimate saturation level. It may also be noted from the grid how far the figure for 1929 falls below the estimate. We see that the saturation point should have been reached within about 3 per cent in 1929, instead of 15 per cent as actually happened. Had the banders reached the island several days sooner, and been able to spend as much time there as during the previous two years, there is no doubt in the minds of any of us who worked on the island that at least 800 more juvenile birds might have been banded. It is a safe prediction that if all goes well in 1930, and an efficiency of

[2] For full discussion see Wilson, E. B., "The Logistic or Autocatalytic Grid," *Proc. Nat. Acad. Sci.*, Vol. II, No. 8, pages 451–456.

banding of 75 per cent is reached, about 5841 young birds will be banded. This checks very nicely with our estimate from the histogram and the mortality figures, for there is a discrepancy between the two of only 459 birds, certainly a very small percentage for a study such as this where the variables cannot be controlled as under laboratory conditions. It is possible, of course, that a higher percentage of efficiency may be reached, which will raise the banding figures to over 6000, but at any rate, we may be sure that it is impossible to band on the island over 8400 young birds, and to band even 75 per cent of these will be an accomplishment to be proud of.

It can be seen readily that the element of chance still exists. Suppose, for example, that a tidal wave overwhelms Tern Island during the nesting-season, or that the whole colony of terns is demolished by rats or summer boarders before any human assistance can be rendered. Suppose the banders are unable to reach the island, what then of the figures? The answer is that the figures make no claim for the future. They

FIGURE 3

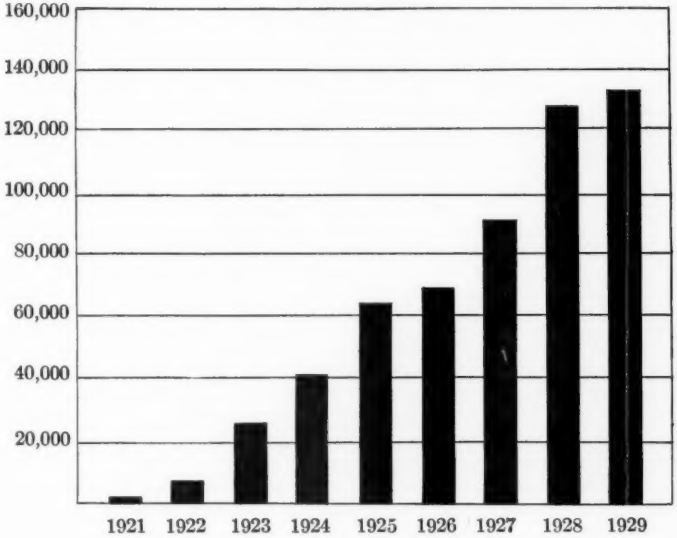


FIGURE 3 shows the total number of birds banded yearly in North America since 1921.

point out the experience of the past and as much as possible of the present. Future banding on Tern Island, when the element of chance is considered, is no more predictable than the population of this earth we live on a hundred years hence. But there is nothing to prevent us from making our estimate, and so long as we make one which is plausible and which is based on the experience of the past, we are quite within our bounds as prophets of the future.

The Biological Survey has furnished us the data for the histogram (see Fig. 3) showing the growth of banding in North America since its official start in 1920. Let us attempt to predict from these data the growth of banding here for the next few years, using the logistic grid method. The value of being able to make such a prediction with but a small percentage of error is obvious, for the better we can plan for the work of the future, the better will our future results be. From the histogram we see at once that though the curve is slightly irregular and has not assumed definite parameters, the number of birds banded yearly is still on the increase. That the curve will eventually be of sigmoid character is evident, but at present there are influencing it too many variable factors which have not yet straightened themselves out.

The yearly increase in the number of birds banded depends on three principal factors: the total bird population of the country, the increase of interest in banding, and the increase in banding efficiency. The ultimate limit of our banding will be when we are banding the maximum possible percentage of the total bird population of the continent. Of course, we cannot as yet estimate that total population, though we may be able to do so when we are able to figure our percentage of banding efficiency more or less accurately. At any rate, whatever our percentage of efficiency is, the fluctuations of the bird population will affect our data, for the number of birds banded must vary with them. We do not know definitely whether this population is increasing or decreasing, much less how much either way, as the case may be, and the best we can do for our present purpose is to assume that the population will be approximately constant now and henceforth. The increase of interest in banding seems to be fairly stable at present, and is not likely to take any sudden large jumps or drops. The most probable manner in which added interest in the subject will increase the growth-rate immediately will be in the more thorough handling, following the example set by Floyd at Tern Island, of the many large colonies of sea-birds hitherto not covered. The factor in which the greatest amount of uncer-

FIGURE 4

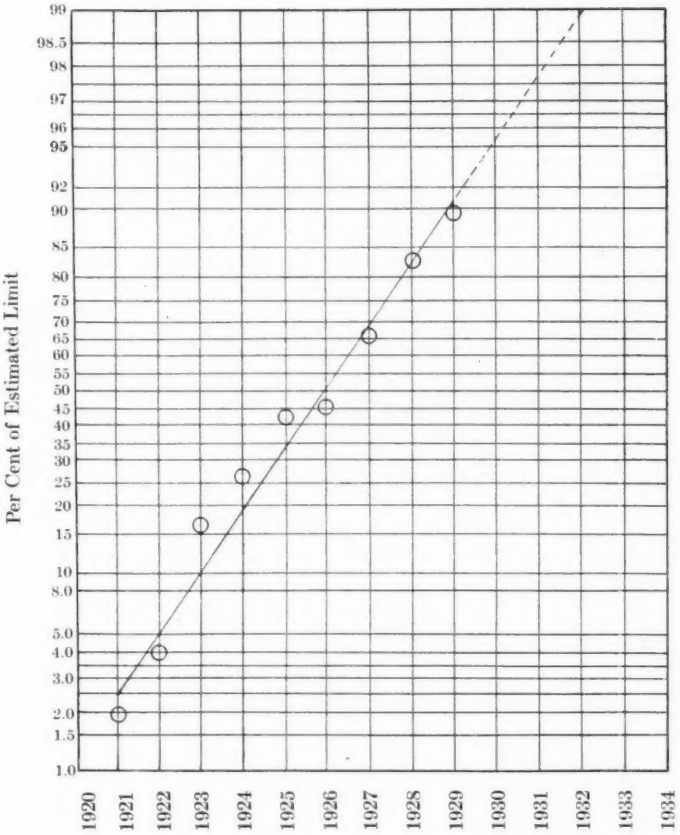


FIGURE 4 shows the data of Figure 3 plotted on logistic grid. The vertical scale is in per cent of an estimated limit, in this case 150,000.

tainty lies is the increase of banding efficiency. We are hampered in our efforts more by the crudity and obsoleteness of our methods of trapping birds than by any other single factor. Banders everywhere are working, either consciously or unconsciously, to improve our technique, and it is very likely that radical changes in the methods now in use may soon appear. This must happen before we can start to band any appreciable percentage of the total bird population.

We have data for only nine years—a pitiful amount when we want to prophesy for thirty years hence. With it we cannot make long-range predictions with any degree of certainty, solely because the true parameters of the curve are not yet evident, though we may estimate for short ranges with an average expected error of not more than ± 4 per cent. In fitting these data to the logistic grid (see Fig. 4) the best fit seems to be made when the maximum banding per year is estimated at 150,000. The grid also shows us that we shall probably reach within 1 per cent of this maximum by 1932, which is as far ahead as we can predict with the data at hand. We should band in 1930 about 142,500 birds, in 1931 about 146,400, and in 1932 about 148,500. This does not seem to be a great increase—only 17,000 in three years—but the fit is within 4 per cent, and there is a possible error of only 6000 birds either way. When this possible error is eliminated from the estimates of 1930 and 1931 by actual fact, and we can add the new figures to the curve, we shall have still less error in our prediction for 1932, and we should be able to predict very safely for 1933, 1934, and 1935, depending on how well the sigmoid character of our curve has asserted itself by then.

It is reasonable to suppose for the present that the growth will be along the trend we have just furnished, and that we shall be banding within 5 per cent of our estimated saturation point by 1932. Whatever it will be, it will be interesting to watch the manner of growth, and by constantly altering our curve on the grid to fit the new data, to improve the accuracy of our predictions. When once the curve is well established along its natural trend, we shall be able not only to predict the total bird population of the country for any future time with considerable accuracy, but we shall be able to show its fluctuations, together with their causes and effects. It will be then, and not until then, that we shall be able to confront our legislatures and other governmental bodies with hard, cold facts, backed by incontrovertible figures, which will permit them to rule properly concerning avian matters.

Orleans, Cape Cod, Mass.

THE DISTRIBUTION OF THE ROUGH-WINGED SWALLOW IN NEW ENGLAND

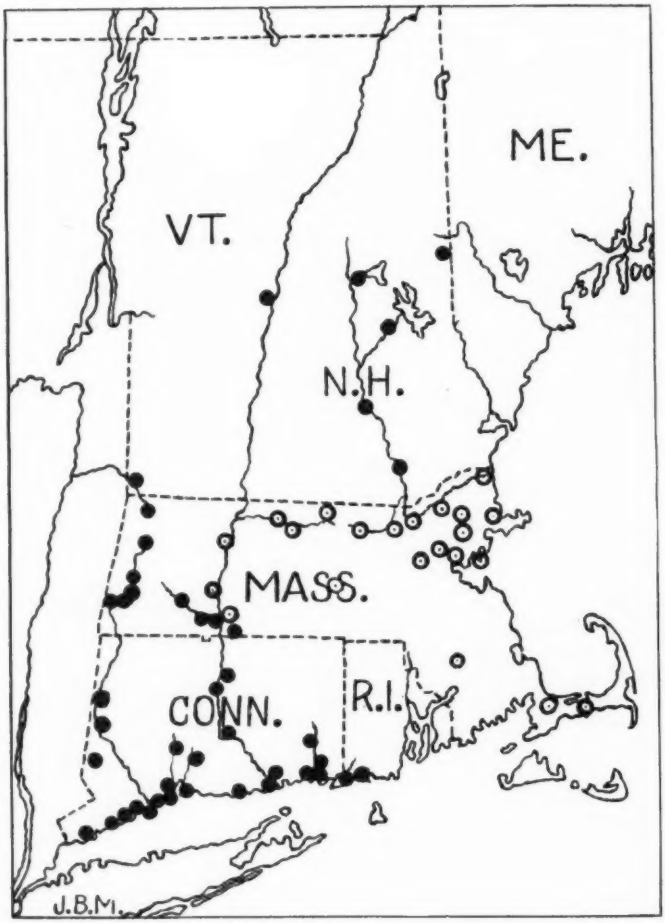
By JOHN B. MAY

IT was my privilege to be asked by the late Edward Howe Forbush to contribute a brief biography of the Rough-winged Swallow (*Stelgidopteryx serripennis*) for the final volume of "The Birds of Massachusetts and Other New England States." As part of that biography a map was prepared showing our present knowledge of the distribution of this bird in our region.

Thirty years ago the bird was considered a very rare straggler to New England except in southwestern Connecticut. Outside of that area, there was but one definite breeding-record, that of a pair of birds which were found nesting at North Adams, Massachusetts, in June, 1895, by Walter Faxon. The only other Massachusetts record of the species was that of a single bird taken at Easthampton in 1851. The bird was unknown in Maine, New Hampshire, Vermont, and Rhode Island, and was considered decidedly rare and local in Connecticut. Since that time, however, it has been recorded as breeding in every State in New England except Maine, and it is now regarded as quite common in Connecticut, though still locally distributed. The species has undoubtedly increased in numbers and extended its range within the last half-century, though the fact that there are many more observers in the field to-day than fifty years ago must be considered in weighing the evidence of our records.

In Connecticut the Rough-winged Swallow was first recorded as a straggler in 1874, when a single bird was taken at Suffield, but it is now considered a regular and not rare breeder in most of the towns along the coast, and it also breeds in numerous inland localities in the valleys of the Housatonic, Naugatuck, Quinnipiack, Connecticut, and Thames Rivers. In recent years it has apparently extended its range into southwestern Rhode Island, where Harry S. Hathaway found it breeding at Westerly in 1917 and in Charlestown in 1929.

The next appearance of the Rough-winged Swallow in Massachusetts, after Faxon reported his North Adams birds, was apparently in 1903, when the species was noted as breeding in Cheshire in Berkshire County. That same year it was observed several times at Groton in northwestern Middlesex County, where it probably bred, although no nest was found or young birds observed. Since that time it has been reported as undoubtedly breeding at Pittsfield, Stockbridge, West Stock-



DISTRIBUTION OF ROUGH-WINGED SWALLOW IN NEW ENGLAND

Breeding records, black circles

Migration records in Massachusetts, black rings

ROUGH-WINGED SWALLOW

Above, nesting-site on Asquam River, New Hampshire. Centre, adult with insects for young. Below, nest opening in Bank.
Photographs by John B. May.

bridge, and Lenox in Berkshire County, Longmeadow, West Springfield, and Westfield in Hampden County, and Huntington in Hampshire County. It was first reported from the coast in 1916, when a pair were seen at Ipswich. There are a number of later reports from Essex County and northern Middlesex, and in May, 1929, a pair were observed at Middleton, Essex County, carrying nesting-material into a burrow, but the nesting-site was abandoned before the eggs were laid.

In Vermont the first authentic record of the Rough-winged Swallow was the nesting of a pair at Norwich in 1905 and 1906, and in the latter year a pair were found breeding at Bennington. Since then the birds have been observed several different summers in the Bennington region. In 1918 a pair was noted several times during June at St. Johnsbury, but no nest was located. There is also the record of a bird taken at Rutland, and one seen at Lunenburg. This last record, if accepted, would be the farthest north that the bird has been found in New England.

The first New Hampshire record to which I have access is that of the Norwich birds, which, in 1905 and 1906, were frequently seen flying about on the New Hampshire side of the Connecticut River at Hanover. In July, 1909, F. I. Martin found Rough-wings breeding at Boscawen in the Merrimack Valley above Concord, but this record was not published, and the first printed account of the nesting of this species in the state was that of Ellen S. Webster, who reported in *Bird-Lore* for 1915 that several pairs nested at Winnisquam in 1913. In 1916 I observed a pair on the Asquam River in Ashland, and in June, 1917, I found a nest and captured and photographed one of the parent birds. Unfortunately bird-banding had not become popular at that time and the bird was released unbanded. In 1923 A. F. McGowan found the birds nesting near Manchester, and in 1925 Grace M. Snow discovered the farthest northeastern breeding-place of the species at Snowville, in the township of Eaton, close to the boundary between Maine and New Hampshire. According to Arthur H. Norton, the species has never been recorded in Maine either as a breeding bird or as a migrant.

The accompanying map, which shows the known breeding-places in New England and the migration or summer records of this bird in Massachusetts, brings out the fondness of this species for the sea-coast and for river valleys. This is especially evident in Connecticut.

The North Adams and Bennington stations are in the valley of the Hoosick River, and the birds apparently enter this

section of New England by way of the Hudson Valley. We have reports from the Connecticut Valley as far north as St. Johnsbury and perhaps Lunenburg in Vermont; the birds have followed its tributary the Millers River to Orange, Athol, and Winchendon in Massachusetts; and perhaps the visitors to the Merrimack watershed have reached that area by following a Connecticut-Millers River-Squanacook-Nashua River route.

The almost complete absence of reports of the Rough-winged Swallow from southeastern Massachusetts is significant and lends force to the hypothesis that this species follows river valleys in migration. The region south and east of the Charles River, which exhibits many traces of the Carolinian fauna and flora, has brought me but three reports of this bird, all stragglers during the migration period.

A more systematic search for nesting-places of this species might bring us much valuable data. The nesting-holes are often large enough for the young to be easily reached for banding, and the adults can be captured by slipping a small landing-net such as most anglers own, over the entrance to the nest when the young birds are being fed. The bird shows a catholic taste in selecting nesting-places, however, as it sometimes apparently excavates its own burrow, but it more often uses that of a Kingfisher or a Bank Swallow, a cranny in a ledge, or a crevice in the foundations of a bridge or factory, and it even at times uses an open tile drain in a river-bank.

Cohasset, Massachusetts.

TWO ADDITIONAL FOOT DISEASES ON BIRDS

By T. E. MUSSELMAN, A.M.

A FOOT MANGE ON CATBIRD NO. 441180

ON July 29, 1928, I captured a transient Catbird (*Dumetella carolinensis*) which had not formerly included my yard in its normal feeding-area. Seldom have I seen a bird so severely afflicted. I was forced to use a band a size and a half larger than is normally required for a Catbird because of huge scabs. Both legs were badly diseased up to the tarsal joint. Heavy cellular proliferation resulting in grayish crusts and knots nearly doubled the size of the bird's legs. (See accompanying plates.) So burdensome were the incrustations that the bird

could fly only with great effort and walking was practically an impossibility.

Its entire health condition was correspondingly poor, as its feathers were disheveled, and the region about the vent was practically devoid of feathers. This may have been the result of summer moult, but I believe it was the result of the general distress in which the bird found itself. General cachexia, furthermore, manifested itself by diarrhea, the discharge being a bloody flux. Of course this may have resulted from a direct infection of the intestinal tract, the leg infection being in no way responsible. However, in domestic chickens, birds which have been badly infected with scaly-leg (which seems very similar to the infection in the present bird) have sometimes been observed to lose feathers, the final breakdown in health being ushered in by a bloody diarrheic condition. I treated the entire infected area with mercurochrome, following with a general massage of the warty surface with vaseline. Small sections of the crusts responded to the softening process and fell. I had hoped that Catbird No. 441180 would repeat, thus allowing me to make daily examinations, but my observations were limited to the one short visit. No positive identification of the disease could be made, yet the pictures and history of this case are here presented in the hope that they may be of some service to some other bird-bander who may have a similarly infected bird visit his traps regularly until the life-cycle and identification of the disease can be positively determined.

NEW FOOT DISEASES ON CHIMNEY SWIFTS

During the last five years I have banded several thousand Chimney Swifts. Few birds are so infected with body lice, but until this year I have found no trace of foot trouble.

On Sunday, September 1, 1929, I captured 546 swifts from one chimney. From fifteen to twenty had infected toes. The first victim I examined had gray tissue-paper-like scales along the tarsus, which, when removed, left a flesh-colored pink under surface. The toes were likewise pink and in several cases swollen to about twice their normal size. In one case the swelling extended well up on the tarsus. There were no scabs or blood-spots, and evidently the infection is not serious, for the birds seemed in good health and in no case was there any foot deformity such as lost nails or missing toes. Information from other banders enlarging on my observations will be appreciated.

Quincy, Illinois.

CATBIRD WITH DISEASED FEET

CATBIRD'S FEET SHOWING INCRUSTATIONS

THE FURTHER HISTORY OF A NESTING PAIR OF JUNCOS

By WENDELL P. SMITH

IN a former number of the *Bulletin* (October, 1928) we published notes resulting from a season's observation of the Slate-colored Junco (*Junco h. hyemalis*). The present paper is a continuation of the study, the more interesting, perhaps, because one of the individuals, the female, No. A87460, a return-1, was a subject of the former study.

The area occupied by the pair (A7999 and A87460) during 1928 was closely watched in the spring of 1929, and while a pair of Juncos took possession, neither individual was banded. We had almost given up hope of any of the family of the preceding year returning, when, on June 8th, about eleven hundred feet west of this area, a nest containing four young some four days old was found. The parents, as usual, came around scolding, and one of them was seen to be wearing a band. A sparrow trap placed near caught this individual, and its identity was established.

The site of this nest was on the side of a steep bank bordering a bog. Two thirds of the area surrounding was wooded, and the remainder was open pasture containing a few scattering trees. The forest, while containing a variety of species of trees, was predominantly evergreen, and white pine (*Pinus Strobus*) the most numerous, with hemlock (*Tsuga canadensis*) a close second. The nest itself was composed of dried grasses placed in a depression evidently of artificial origin, and was so arranged that the bank above partially overarched, thereby affording protection from rain. A clump of ferns partially concealed it.

Of the parent's care of the young, little of additional interest was learned. The male parent, who soon acquired an identity as C1505, was more industrious than his predecessor, A7999. During the periods under observation he came nearer doing his share of the feeding. The young were fed a number of insects, these being caught in the air. Among the number, a certain medium-sized moth was noted and an unsuccessful attempt to catch one of these was seen, the bird being unable to gauge its movements to intercept the moth in its irregular flight.

The young were banded in the nest and bore the series C1501–04. On the 14th of June, they left the nest, the first

leaving before 6.00 A.M. and the last about 10.00 A.M. Some followed the bank, and others flew out into the bog, but the initial flight carried none farther than one hundred feet from the nest. A series of heavy thunder-showers prevented me from following the fortunes of the family further that day, but in the morning of the 15th, three young were found in the bog and all separated from each other, two by at least a hundred and fifty feet. One individual was two hundred feet from the nest, while one had probably moved but little since its first flight. They could fly well, but, owing to the shortness of their tails, they experienced difficulty in alighting. Both parents were with the young until June 30th. After that date the female was not seen with them, but the male associated with them intermittently until July 5th. In the meantime the family moved about, traveling along the top of the wooded bank where it bordered open pasture. On June 24th, they reached their maximum distance from the nest in these wanderings, approximately one thousand feet and then began to retrace their way, returning to within four hundred feet on the 25th and, on the 26th, to within one hundred feet. From this time on they could be found at distances varying from a hundred and fifty to four hundred feet from the nest. Gradually parental care lessened and finally disappeared. No anxiety was shown by the male on July 1st, when we approached the young. This was coincident with the development of mature behavior in the young birds, the latter uttering the adult alarm-note and flying up displaying the white outer tail-feathers conspicuously. After July 4th, we did not hear the infantile lisping note. They apparently disappeared from the locality on July 6th.

Preparations for a second brood probably began about July 1st. On the second we saw the male and female near the first nest and a hundred and fifty feet from the young. The male was singing, and the female was fluttering excitedly and displaying her white outer tail-feathers, while uttering a twittering note resembling the call of the young but lacking the lisping quality of the latter. After July 6th, the male spent much time in singing. Before July 1st singing had been an occasional indulgence but from this time on it became more frequent and regular and after the 6th consumed hours. He sang from a number of places within a radius of six hundred feet and seldom nearer than three hundred. Search failed to locate the second nest until July 14th, when it was found in the open pasture at a distance of a hundred and twenty-five feet from the first nest. It was unshaded, although the nearest tree, a small balsam fir

was only twelve feet away. This nest was located in the side of a grass hummock, and position and construction resembled that of the first nest. At the time of its discovery the nest contained four young a few hours old. This brood disappeared during the night of July 18th. The identity of the marauder could not be determined, but as the nest had been torn out bodily from its position, a mammal was undoubtedly responsible, and as a skunk was seen hunting in the vicinity at dusk of the preceding night, suspicion falls upon that species.

On July 19th no trace of the parents could be found in the area, and we feared that they had abandoned it, but on the 21st the female was seen on the bank bordering the bog, at a point seventy-five feet distant from the second nest and fifty feet from the first, evidently engaged in nest-building. A few feet away a completed nest lay which had been torn from its position. The bird scolded us for a few seconds and then flew into the bog, but returned shortly and disappeared in grass at the spot from which she had been flushed. We could not see her after she alighted, and, because of previous experience with this species when nest-building, did not dare to make further observations for fear of causing her to abandon the effort. This fourth nest was found completed on the 22nd. Position and construction of both the third nest, which had been partially destroyed, and the fourth, were similar to that of the first and second. Like the second both of the later nests were built in the open. The dried grasses used in the construction of the two later nests apparently came from one spot about ten feet away. On July 25th, the first egg was laid, and on July 27th the clutch was completed. Incubation began with the second egg on the 26th.

During the season of 1928, A87460 showed some degree of regularity in leaving the nest for food. One of these feeding-periods came between 8.30 and 9.00 A.M. This year the following schedule was observed: On July 30th the bird left the nest at 8.45 and returned at 8.59 A.M.; the 31st, left at 8.43, returned at 8.48 A.M. On August 1st the times of leaving and of returning were 8.48 and 8.58 A.M. respectively, and for the 7th, 8.49 and 9.12 A.M. Another period came about noon as the following time-table indicates: On July 28th, time of leaving was 12.10 P.M. and time of return 12.25; August 4th, 11.45 and 11.59 A.M.; August 5th, 12.10 and 12.21 P.M. At one time we found the nest vacant at 3.15 P.M. This seemed to indicate feeding once in three hours, but we could not keep constant watch in order to determine it.

The bird in leaving the nest flew to a tree near by, usually a

small larch fifteen feet away. After a moment's careful scrutiny of her surroundings, during which she uttered the alarm-note, she would fly to a sweet-fern (*Myrica asplenifolia*) patch, forty feet distant in the opposite direction where food was obtained. Sometimes the course was varied by flight to another tree, this being at right angles to direct line to feeding-ground. In returning, much the same course was followed but the bird never flew directly to the nest, always alighting several feet away and hopping, as inconspicuously as possible, the remaining distance. Once we observed a bath in a small rill issuing from a spring, thirty feet from the nest. This followed the feeding-period, and upon its completion and a moment's rearranging of feathers the bird returned to the nest.

Two of the eggs hatched on August 7th, and the third on August 8th, giving an incubation period of twelve days. The male, who for the most part had been absent during incubation, appeared on August 9th and took part in caring for the young. In our observations during 1928 we made notes on the development of the young, and this year the opportunity for checking these was improved. With one exception the observations tallied. In 1928 we described the color of the natal down as the "deep gull gray" of Ridgway's "Color Standards and Color Nomenclature," but, owing to deep shade and cloudy weather, we had very poor light. This year, under better conditions, the natal down seemed clearly the "deep neutral gray" of Ridgway's "Color Standards."

The young of the third brood left the nest on August 18th, bearing bands numbered C1513–15, having spent from ten to eleven days in the nest. Their first flight carried them to some bushes seventy-five feet distant, where they spent the night and part of the following day. On the 20th they were found two hundred feet from the nest. During the following three days the family remained within this area, the limits extending perhaps one hundred feet farther away from the nest. On the 26th one of the young with a parent was seen four fundred feet away from the nest in another direction, while the other parent, also accompanied by at least one of the young, was at least three hundred feet from the nest in the opposite direction, making the two divisions of the family some seven hundred feet apart; but on the 27th they were reunited in the bog and here they remained until September 4th, when they seemingly disappeared, for careful and repeated search after that date failed to locate them. On the 7th the woods seemed full of Juncos, indicating that the southward movement had begun.

Of this brood, we think one hundred per cent survived to the

time of departure from the locality, and of the first brood at least three of the four were living at the time their parents left them. Next year we shall look forward to the possible return of some of the family, when opportunity for further study will be afforded.

Wells River, Vt.

EVENING GROSBEAK RECOVERIES INDICATING AN EAST-AND-WEST MOVEMENT

By M. J. MAGEE

IN my paper "Evening Grosbeak Recoveries," published in the April, 1928, number of the *Bulletin*, I stated: "Dr. Christoferson and I had suspected for some years that there was more of an east-and-west movement of our Evening Grosbeaks than a north-and-south one." Recoveries reported from localities east of my banding station were: two from around Quebec City; one from Massachusetts; and one from Connecticut. To the west of my station was one from Menominee, Michigan, one hundred ninety miles west-southwest of the Soo.

This year (1929) has added three more recoveries as follows:

No. 581875 Adult female. Trapped by me January 27, 1929.
Banded at Hanover, New Hampshire, March 9, 1928.
No. 691399 Adult male. Banded by me February 2, 1929.
Found dead at Northome, Minnesota, about May 15, 1929.
No. A210271 Adult male. Banded by me March 8, 1929.
Trapped at Karlstad, Minnesota, May 24, 1929.

Karlstad is well up in the northwest corner of Minnesota in Kittson County. From that point to Quebec and New Hampshire gives an east-and-west distance of over twelve hundred miles, with Sault Ste. Marie about half way between the two extreme localities.

This summer, as usual, Evening Grosbeaks can be found in numbers, from thirty-five to a hundred and twenty-five miles west of Sault Ste. Marie. In June I got a report that a large flock was at Eckerman, thirty-five miles to the west. June 30th I drove out to see for myself. The Grosbeaks were picking about on the ground, right at the side of the road, where salt water from ice-cream tubs had been dumped. Coffee-grounds were also thrown in the same place. I was told that the birds were after the coffee-grounds, but I think it was the salt they wanted. I counted thirty-two on the ground at one time, eight of which were banded birds. I was informed that it was not

unusual, in the early morning, for from sixty to seventy-five to be on the ground at one time.

The locations where Evening Grosbeaks banded by me have been recovered and the location where one recovered by me was banded are shown by numbers on the outline sketch map below. The solid black square is the location where the birds have been checked every month through the summer for ten years and where nests were located once. It starts about thirty-five miles west of my banding station.

The details of banding dates, sexes, and recovery dates are as follows:

No. 1 Adult female. Killed, March 9, 1926, 25 miles east of Quebec City. Banded, Soo, Michigan, March 23, 1924.

No. 2 Adult male. Found dead, McMillan, Michigan, early in July, 1926. Banded, Soo, Michigan, March 15, 1926.

No. 3 Adult male. Trapped, West Hartford, Connecticut, January 30, 1928. Banded, Soo, Michigan, March 14, 1925.

No. 4 Adult male. Trapped, Quebec City, February 10, 1928. Banded, Soo, Michigan, February 27, 1927.

No. 5 Adult female. Trapped, Huntington, Massachusetts, February 22, 1928. Banded, Soo, Michigan, March 10, 1927.

No. 6 Adult male. Found dying, Menominee, Michigan, March 17, 1928. Banded, Soo, Michigan, March 26, 1927.

No. 7 Adult female. Banded, Hanover, New Hampshire, March 9, 1928. Trapped, Soo, Michigan, January 27, 1929.

No. 8 Adult male. Found dead, Northome, Minnesota, May 15, 1929. Banded, Soo, Michigan, February 2, 1929.

No. 9 Adult male. Trapped, Karlstad, Minnesota, May 24, 1929. Banded, Soo, Michigan, March 8, 1929

Sault Ste. Marie, Michigan.

MAP SHOWING LOCATIONS OF BANDING STATION AND EVENING GROSBEAK RECOVERIES

GENERAL NOTES

Homing Instinct in Cowbirds.—That the homing instinct during the nesting-period is firmly fixed in at least one member of the cowbird species (*Molothrus a. ater*) was established without doubt during the summer of 1929 at our banding station in Glenolden, Pennsylvania. At the time this Cowbird formed the trap habit, being captured nearly every day for over a month, sometimes four times a day, a pair of Yellow Warblers nesting close by suddenly deserted, and we placed the blame on the Cowbird. About six weeks later a Yellow Warbler was observed feeding an immature Cowbird, which would seem to verify our conclusions. This is the first time the writer has actually seen the Summer Yellowbird with a Cowbird "in tow."

The female Cowbird was observed one morning entering a cavity in which Crested Flycatchers appeared to be about ready to nest. Not wishing to have the Flycatchers driven away by the Cowbird, we decided to take her several miles away in the hope that she would not return. The following day our traps were not set, but the morning after that the Cowbird was recaptured. Her first excursion had been to the northeast, so we decided to take her in another direction, and several days later released her two miles to the south by the Delaware River. In three hours she was back in the trap partaking of some soda crackers, of which she seemed to be very fond.

The following day she was taken northeast to Philadelphia and released at a point eight miles distant in the heart of the city amid the skyscrapers. When last seen she was headed toward the east in the direction of the Delaware River and New Jersey, but Mrs. Gillespie telephoned me four hours later that, like a bad penny, she had come back.

She was next deported to Wilmington, Delaware, about twenty miles southwest, and we felt confident that we had at last got rid of her (but hoped we hadn't). At lunch-time, just four hours later, she again appeared at our banding station.

Arrangements were made to send her into Maryland the next day, fifty miles away, but we never saw the bird again, and the probabilities are that our neighbor's cat made away with her.

To the writer it appears rather unusual that the homing instinct should be so pronounced in a species having no nest, eggs, or young of its own to care for. A persistent craving for the particular food we offered seems to be the most plausible explanation for the actions of this bird.

That immature Cowbirds may possess the homing instinct was demonstrated several summers ago on Martha's Vineyard Island when two immature Cowbirds were released three miles from our banding station on the opposite side of the town of Oak Bluffs. One of them returned to the traps about seven hours later.—JOHN A. GILLESPIE, Glenolden, Pennsylvania, November 3, 1929.

A Saw-whet Owl Banded, and Other Experiences with this Species—On the afternoon of Armistice Day a boy who had been following the trails of the Bird Sanctuary reported to me that he had seen a very small owl, and, though thinking it merely the common Screech Owl, I inquired where it had been found. "It is in a pine tree right near the entrance to that trail," he said, and so I accompanied him to the spot. There, perched close to the trunk on a low branch of a white pine, sat *Cryptoglaux acadica* staring at us with its bright yellow eyes.

Approaching slowly, I extended my hand to within a few inches of the bird, and almost grasped it as it flew to another pine close by. Asking the "discoverer" to watch it, I hurried for my insect net, and by holding this

open directly in front of the bird had no difficulty in taking it. In my hand, with its feet held between the fingers, it made no effort to get away or to bite, and submitted to being stroked and petted by the score or more to whom I displayed the prize. At dusk, after applying band No. 279510, I released the bird and watched it fly to the shelter of the pines again.

The living owls, of all species, are too interesting, and, excepting possibly the Great Horned Owl, too valuable to greet with a shot-gun at every opportunity. I have been fortunate in finding the Saw-whet Owl on four occasions, though unfortunately the first time with a gun. This was on November 10, 1913, at Westfield, Connecticut, when the Owl was flushed from the ground and shot in mistake for a Woodcock. On November 23, 1926, I discovered a Saw-Whet perched in a tree in the Sanctuary not far from where this last visitor was taken. The next night, November 24th, probably the same Owl was seen to rise from the ground just before dusk with a meadow mouse in its talons, and it flew to a low tree, where it killed and devoured its prey. The Saw-whet Owl is unmistakable if seen perched in good light; the much more rare Richardson's Owl being decidedly larger. —Lester W. Smith, Stone Bird Sanctuary, Babson Park, Massachusetts.

Canada Jay Migration.—An account of the unusual movement, or migration, of Canada Jays that has been taking place since last summer and is still going on (December 4, 1929) is being prepared by Harrison F. Lewis, National Parks of Canada, Ottawa, Canada, who will appreciate any information, however scanty, relating to this subject.

Bee-eating Catbird.—Italian honey-bees had invaded a flooring section of our summer cottage on the shores of Narragansett Bay by finding entrance at the edge of the porch roof. Catbirds frequently were seen flying in the vicinity as though searching for the bees. As I sat in a rocking-chair with field-glasses in hand, a Catbird was seen to fly to where the bees found entrance to their hive under the flooring of a second-floor room. The Catbird caught a bee on the wing and alighted on a porch rafter not ten feet from me. The bee was distinctly seen to be in a transverse hold in the bird's bill, but the bird by a tossing motion of the head was able to rearrange the bee so that it faced downward toward the bird's throat. Without any crushing to kill the bee, the bird swallowed it alive. I am certain of all these moves as they were very distinctly seen and were repeated on other days. As a bee is killed it is able to sting, and will sting. I have been stung by the sting many hours after it has been removed from a bee or the bee has been killed. After the live bee was swallowed by the Catbird, it doubtless lived inside the esophagus and stomach of the bird for an appreciable time. The point for settlement is whether birds are immune to bee stings and, if so, what makes them immune.—Harold B. Wood, M.D., Harrisburg, Pennsylvania.

More Notes on the Spring Moult of the Evening Grosbeak.—This year (1929) from April 13th, the earliest date on which I noticed any new feathers coming, to May 17th, the latest date on which I could find any new feathers, I looked over fifty Evening Grosbeaks at my banding station at Sault Ste. Marie, Michigan. Thirty-one showed some moult, while on nineteen I could detect no new feathers coming. On the birds examined, the moult was largely confined to the front of the head, including chin, and the neck. I am rather of the opinion that all the birds had some moult. It is not always an easy matter to examine live birds as carefully as you would like to do. On dull and rainy days the light was sometimes poor.

Dr. Dwight in his paper "The Sequence of Plumages and Moults of the Passerine Birds of New York," published in Part I, Vol. XIII, *Annals of the New York Academy of Sciences*, Page 94, states: "The head tract is of paramount importance because if any partial prenuptial moult takes place, the new feathers will be found here and on the chin and often nowhere else," and the paragraph ends with the statement: "Although the feathers of the head tract are very numerous they are, most of them, so extremely small that their moult may be very easily overlooked."

Last year (1928) out of ninety-three birds looked over, I noted only twenty-four as showing any moult, though I may have missed some. Next spring I expect to make a further check with a more powerful glass than I used this year, so expect to detect moult on a larger number. Of the birds checked this year as showing moult, eighteen were females and thirteen were males. Dr. Dwight states under "First Winter Plumage of Male Evening Grosbeaks": "The young may be distinguished usually by the dusky inner margins of the tertiaries." Nine of the thirteen males showed dusky inner margins. As to the females, I doubt if you can be sure of the age, although I am inclined to believe that those showing the lighter color on throat are the older birds. Of the eighteen females checked some had throats of the same color as the surrounding parts, some had throats a little lighter, and others had throats very distinctly lighter. Apparently the spring moult is not confined to age or sex. The list of birds examined follows:

April 13	Male.	A number of new feathers on throat and cervix.
	Female.	A few new feathers coming on rump.
April 14	Male.	A few new feathers on cervix, jugulum, sides of neck, and lores.
	Male.	A few new feathers on chin and on sides of upper bill.
	Male.	A number of new feathers on cervix, jugulum, and sides of neck.
	Female.	Two new feathers on crown and a number on cervix, jugulum, and sides of neck.
	Female.	A number of new feathers on cervix, jugulum, and sides of neck.
	Male.	A number of new feathers on cervix, jugulum, and sides of neck, and a few in lores.
	Male.	A few new feathers in lores.
	Male.	A few new feathers in lores.
	Two, a male and a female—no moult.	
April 17	Five, two males and three females—no moult.	
April 18	Male.	No moult.
April 19	Female.	A few new feathers around base of bill.
	Male.	A few new feathers on crown, around base of bill, cervix, jugulum, and sides of neck, and three or four on breast.
	Female.	A few new feathers around base of bill and in lores.
	Male.	No moult.
April 20	Male.	A few new feathers around base of bill and neck, lores, and a patch on left auricular.
April 21	Male.	A number of new feathers on crown, cervix, jugulum, sides of neck, and base of bill.
	Female.	Moulting entire chin. Some new feathers on base upper bill, in lores, and on cervix, jugulum, and sides of neck.
	Male.	Some new feathers on chin and throat, around base of bill, cervix, jugulum, and sides of neck, and in lores.
	Female.	Some new feathers in lores, around base of bill, cervix, jugulum, and sides of neck.
	Male.	Some new feathers in lores, around base of bill, cervix, jugulum, and sides of neck.
April 23	Female.	A few new feathers in lores, cervix, jugulum, and sides of neck.
	Female.	Some new feathers on neck.
	Female.	Some new feathers on neck.
	Female.	Many new feathers on cervix, jugulum, and sides of neck.
	Female.	Some new feathers in lores, and on cervix, jugulum, and sides of neck. Trapped again May 12th, moulting apparently about completed.
April 26	Female.	Some new feathers coming on cervix, jugulum, and sides of neck.
April 28	Three, one male and two females—no moult.	
May 2	Female.	A few new feathers on cervix.
	Male.	A few new feathers right side of neck.
May 8	Female.	Two or three new feathers on cervix, a few on auriculars and lores, and two or three on crown.
	Female.	No moult.

May 9 Female. Some very small feathers on chin at base of lower bill.
May 10 Two, a male and a female—no moult.
May 16 Female. Some new feathers on cervix, jugulum, and sides of neck.
Male. No moult.
May 17 Female. Two or three new feathers on cervix.
Three, one male and two females—no moult.

M. J. MAGEE, Sault Ste. Marie, Michigan, November 30, 1929.

Grackle Recoveries.—Several records of grackle recoveries have already appeared in issues of this *Bulletin*. In Vol. II, January, 1926, Charles B. Floyd lists the following Bronzed Grackles banded in Auburndale, Massachusetts, and taken later at other points:

Banded	*Recovered*	
Sept. 2, 1925	Wellesley Hills, Mass.	Sept. 24, 1925
Oct. 20, 1923	New Haven, Conn.	Nov. 13, 1923
Sept. 11, 1922	Elizabeth, N. J.	Nov. 7, 1922
Aug. 13, 1925	Benns Church, Va.	Nov. 29, 1925

He notes that this indicates a southwesterly migration along the Atlantic coast. In Vol. IV of the *Bulletin*, April, 1928, Dr. E. G. Rowland reports a Bronzed Grackle banded June 6, 1926, at Norwich, Connecticut, killed in Tyner, North Carolina, December 23, 1927.

Since Mr Gillespie and I have been banding Grackles for a number of years on Martha's Vineyard, the geography of their migration has interested me considerably. It would be possible for them to move in a northerly or westerly direction to the mainland and then follow the coast of Long Island or Connecticut west and New Jersey south. This seems the more logical route, yet it is a fact that as the Grackles gather in summer flocks on the island they slowly move south toward Edgartown. This suggests the possibility of an overseas flight in a southwesterly direction toward the New Jersey coast.

Before giving the results of our two Grackle recoveries, it may be well to state that Purple, Bronzed, and intermediate blends of Grackles breed on Martha's Vineyard. During the summer, when the young birds are still dull brown in color, it is impossible to distinguish between the subspecies by any means which we have yet discovered. Therefore, by permission of the Biological Survey, the immature Grackles are banded without definite identification. Whether the migration routes would necessarily vary for Purple and Bronzed Grackles is not known, but I should be inclined to think not, because of the prevalence of intermediate hybrids.

An immature Grackle banded on Martha's Vineyard, August 12, 1927, was killed by a cat at Newport, Rhode Island, November 22, 1927. This is a bit late compared with the dates given above along the theoretical migration route, but the fact that the bird was caught by a cat suggests the possibility of its lingering behind the flock because of some physical incapacity. The proof that it had traveled west from the island to the mainland is the important detail. The bird was reported as being brightly marked with purple when caught, but as it was first incorrectly reported as a Starling we cannot be sure that it was of the subspecies *quiscula*.

Another immature Grackle banded on Martha's Vineyard July 17, 1925, was shot in Caroline County, Maryland, along the marshes of the Choptank River. This region is on the eastern shore of Chesapeake Bay. The following is quoted from the letter written us by the man who shot the bird:

> "I was hunting and these grackles flew by; in the bunch was a pure white bird and I shot it, but when I did several of the grackles fell, too, and one was banded,—the one which I sent in. These grackles were of the bronzed type or species, but we have the purplish species also. Many people shoot them for food, and in fact they make an excellent dish. The

grackles seem to be a very friendly bird, and one can almost get near enough to catch one. In the lower section of our County near the river there are many of these birds, but away from the water I have never seen one."

These two recoveries give a little added weight to Floyd's theory of the southwesterly migration along the Atlantic Coast.—MABEL GILLESPIE, Glenolden, Pennsylvania, November 3, 1929.

Returning Western Birds.—It is important to enumerate the species and races of birds which return[1] to their nesting-grounds or to their wintering-grounds, and more particularly, from a biological standpoint, to the same spot where they were born, nested, or wintered. When a group of birds wholly or in large part returns to the same spot, either to nesting- or to wintering-grounds, the biological significance of such behavior increases greatly.

In *News from Bird Banders*, published quarterly by the Western Bird Banding Association Vol. IV, Oct. 1929, p. 33, John McB. Robertson writes that Carl Levingston, of Redlands, California, has had returns of fifty-one Gambel's Sparrows, five Golden-crowned Sparrows, one Fox Sparrow (race not given), 10 Song Sparrows (race or races not given), and nine Audubon's Warblers. The nesting- and wintering-ranges of these species are indicated on small-scale maps in the "Field Book of Birds of the Southwestern United States," by Wyman and Burnell, from which we learn that the Gambel's, Golden-crowned, and Fox Sparrows, and Audubon's Warblers were on their wintering-grounds when banded. From Levingston I have secured more detailed information regarding the years the birds were banded and returned, as well as other data of interest, which perhaps can be intelligibly condensed in tabular form as follows:

Species	*Scientific Name*	*Number Banded*	*Season of Banding*	*Number Returns*	*Season Returning*	*Per cent Returning*	*Remarks*
Gambel's Sparrow	*Zonotrichia l. gambeli*	106	1926–27	18	1927–28	17.00 (approx.)	During 1928–29 7% returned.
Gambel's Sparrow	*Zonotrichia l. gambeli*	279	1927–28	46	1928–29	16.50	
Golden-crowned Sparrow	*Zonotrichia coronata*	17	1927–28	5	1928–29	30.00 (approx.)	
Fox Sparrow	*Passerella iliaca*	2	1927–28	1	1928–29	50.00	Race not given.
Audubon's Warbler	*Dendroica a. auduboni*	57	1926–27	3	1927–28	5.30 (approx.)	Of these three returns, one was a return-2 W in 1928–29.
Audubon's Warbler	*Dendroica a. auduboni*	45	1927–28	8	1928–29	17.77	

[1]The word "return" may be used in the manner in which it has been employed by the *Bulletin of the Northeastern Bird-Banding Association* and also to cover cases of returns having somewhat different ornithological significances, such as appear in Mrs. Gillespie's paper in this number of *Bird-Banding*.

Regarding these returns, Levingston writes: "In all cases these birds returned the following winter [after they were banded] to the same place, not varying one hundred yards." He writes also that his use of the word return is as follows: "A return in my usage is that a bird has been recaptured the following winter—Example:—A bird [migrant] may have been banded in March, 1927, and recaptured in October, 1928. There has been time enough for the bird to have raised young and come back again to winter quarters."

Whereas many returns of the White-crowned Sparrow have been published (see *Technical Bulletin* No. 32, by Frederick C. Lincoln), data appear to be lacking as to the race or races making up the total, since they are tabulated under the name *leucophrys*. Some of Levingston's records, therefore, are of special interest since the race of the White-crowned sparrow, *gambeli*, is known. In case of the Audubon's Warbler returns, the migration indicated may well have been to nesting-grounds situated at cool elevations in the vicinity of his banding station, for, as is well known, some birds of this species gain necessary nesting-conditions both by seeking high altitudes near by in southern California and by long migrations northerly. —C. L. WHITTLE.

Remarkable Returns.—Mrs. Elizabeth L. Burbank, of Sandwich, Massachusetts, reports that during May, 1929, she had seven Chipping Sparrow returns out of twelve banded in 1928, or 58.33 per cent, a remarkable record. Four Chipping Sparrows nested close to her station during 1929, three of which repeated several times in May, and two repeated in July. It is probable that other returns continued their migration to places too far away for them to visit her traps during the nesting-season. It may well be that these birds nested near by, but farther away than their ranging distance during the nesting period. It is hoped that a thorough trapping of all nesting birds about a station, involving several acres or even more, will be undertaken to throw light on the distribution of say nesting Chipping Sparrows taken as returns earlier in the season. In this connection, the degree of sociability practised by Chipping Sparrows and other species, as shown by their nests, is well worth determining.

Mrs. Burbank also reports the first instance of a returning Myrtle Warbler and also the finding of a second bird of the same species dead on a "tar road" about half a mile from her station, presumably killed by an automobile. The data on these two birds follow:

No. A80338, male, banded March 12, 1927. Returned, April 19, 1929.
No. A80337, male, banded March 12, 1927. Found dead, April 2, 1929.

As this species does not nest in Sandwich, the two birds banded on March 12, 1927, when migrating north, were captured in April, 1929, again on their way north to their nesting-grounds, that is, they were *migrating* returns, as Mrs. Gillespie calls them, and the suggestion is made (see her article in this number) that returns of this sort be represented by Return-1 M. N., that is, a migrating return-1 going north.

It is gratifying to report instances of this sort, the first of the kind, of which we need many more if the details of aspecies' migration route are to be determined.—C. L. WHITTLE.

RECENT LITERATURE

The Cowbirds: A Study in the Biology of Social Parasitism. By Herbert Friedmann. Published by Chas. C. Thomas, Springfield, Illinois.

This excellent monograph is the result of five years' research. Three breeding seasons were spent in New York State, one in Argentina, and another on the border between Texas and Mexico. All but two of the seven species of true Cowbirds of the genera *Agelaioides*, *Molothrus*, and *Tangavius* were studied in the field. The literature was thoroughly explored, and museum specimens were critically examined. The life-histories of the different species are exhaustively treated under numerous special headings, and the volume summarizes the latest and most complete information available.

As the result of his investigations Dr. Friedmann advances some very interesting theories regarding "The Evolution of the Present Cowbirds" and "The Origin and Evolution of the Parasitic Habit." His theory that "the loss of the protecting instinct of the male" was the cause of the development of the parasitic habit, is based partly upon the "territorial relations" of the various species, and he describes the different stages, from the Bay-winged Cowbird of South America, which he considers the most primitive type and which, while non-parasitic, usually lays its eggs in abandoned nests of other species or in nests taken by force from their rightful owners, to the North American Cowbird, which is entirely parasitic, and which marks the greatest divergence geographically and genealogically from the parent stock.

Dr. Friedmann concludes his interesting contribution with the statement that "there is still much to be learned about the Cowbirds" and that the explanation which he offers "is by no means the last word to be said upon the subject." We suggest that bird-banders make an especial effort to gather additional data on the sexual relations, the territorial habits, and other details of the life-histories of our native Cowbird species and races. Very little has been published regarding banded Cowbirds, although the second issue of the *Bulletin of the Northeastern Bird-Banding Association* (Vol. I. pp. 22-24, 1925) contained a suggestive article by Laurence B. Fletcher on "A Cowbird's Maternal Instinct" which is not mentioned in the bibliography of the volume here reviewed.—J. B. M.

The Condor. Volume XXXI, 1929. During the past year the official organ of the Cooper Ornithological Club has contained several articles contributed by bird-banders and recording observations on banded birds. In the May-June issue Mr. E. L. Sumner, Jr., reported "Comparative Studies in the Growth of Young Raptores." The species considered were Cooper's, Western Red-tailed, and Desert Sparrow Hawks, Golden Eagles, Barn, Long-eared, Southern California Screech, and Pacific Horned Owls. Weighing commenced in many instances with the egg and was continued at regular intervals until the banded young left the nest. Detailed tables are printed, with graphs which exhibit the fluctuations in weight, and in some cases records of feather-growth are also given. Where it was possible to make a complete record of the weights the graphs show "a marked loss toward the end of the nest life. After the first abrupt rise there is a gradual flattening of the curve and then a period of fluctuation and decline, usually without any marked increase thereafter."

Joseph Mailliard contributes two articles of interest, "Gleanings from Recent Bird Banding" in the September-October issue, and "Reaction toward Capture among Certain Sparrows" in the November-December number. In the first article he reports that, of 189 Nuttall's Sparrows banded, with 270 recaptures, only nine were retaken at another station than

that where they were originally banded, though the several stations were separated only by 90 to 150 yards. "The constant return of the great majority of the Nuttall Sparrows to the spot in which they were banded, some individuals doing so over twenty times, seems to prove beyond doubt that each flock or association of individuals occupies an area from which it seldom strays, and that the range of each flock is only in certain directions from its roosting place." In his second article Mr. Mailliard states "there is a noticeable variation in the reactions of different genera toward the realization of confinement in a trap, and also a great difference noticeable between individuals of any one species." There was a marked difference in behavior between the Marin Song Sparrow, a *Melospiza*, and the Golden-crowned and Nuttall's Sparrows, both of the genus *Zonotrichia*. The latter "run more or less around the trap, trying to find some opening through which to escape, but they do this in a heedless, haphazard manner, blindly as it were," and they almost invariably overlooked the small funnel-shaped entrance of the trap. The Song Sparrows, on the other hand, "travel around much more rapidly inside the trap, but ever with a keen eye for an opening and with a brain ready to take instant advantage of any possibility that may attract the eye. . . . The sharp eyes and active brain of at least some members of the genus *Melospiza* are extremely apt to find that small opening and the birds to dart through it to liberty."

In the September-October issue Mr. J. Eugene Law discusses "The Spring Molt in Zonotrichia" at some length. Anyone who has attempted to study molts from a series of "museum skins" realizes that only part of the story can be learned in that way. Mr. Law has supplemented his study of dried skins and of freshly collected specimens with detailed records of trapped and banded birds. From this material he draws some rather interesting deductions and throws light upon a subject which has been rather neglected by many ornithologists. Both Dwight and Chapman state that there is a first prenuptial molt restricted mainly to the head, neck, and anterior parts of the body and that in older birds this molt is even more restricted. Mr. Law found that his Western *Zonotrichiæ* at their first prenuptial molt passed through "a rather complete molt of the body or contour feathers, and . . . most, perhaps all, of the coverts of the wing, above and below, which are proximal to the carpal joint, and probably all the coverts of the tail, above and below. It also involves the three tertiary remiges of the wings and, as well, the deck or middle pair of tail feathers." Apparently the dorsal saddle and rump have no spring molt. Mr. Law believes that older birds have a similarly complete spring molt. He brings out the suggestive fact that when a bird's wings are folded, as they are much of the time when it is not flying, all the areas which are not renewed in the spring molt are covered and that "it appears, therefore, that only the tracts of the body directly exposed to abrasion and sunlight are renewed in the spring molt. One can but marvel at this subtle adjustment." He concludes: "in the genus *Zonotrichia* we find a whole group of species whose pattern of plumage, about the head at least, has undergone widely divergent modifications. And yet, this whole group is still perfectly tied together by a similar and somewhat unique habit of spring molt. Is there any other one character among the species of this genus which provides better evidence of genetic relationships than does this rare character of spring molt?"

Mr. John McB. Robertson contributes "Some Results of Bird Banding in 1928" to the November-December issue, with five maps, the first of which shows the locations of some seventy-four banding stations in the western United States and Canada. The reports from sixty-six banders totalled 23,091 birds, of 164 species or subspecies, banded by members of the Western Bird Banding Association during 1928. Two of the maps are of returns of gulls banded by Mr. Frank L. Farley at Camrose, Alberta, in

1927 and 1928 respectively. It is interesting to note that no banded birds were observed about the breeding place a year after banding, strengthening our theory that gulls and terns do not breed until they are more than one year old. Another map shows returns of Mallards banded in Alberta in 1928, ten birds having been recovered,which indicated a decided southeastern migration route, in marked contrast to an earlier map of returns of banded Mallards from Moiese, Montana, in 1927, which showed a very marked southwestern dispersal. The fifth map gives recoveries of hawks and owls banded in southern California by E. L. Sumner, Jr. Five Barn Owls, recovered from two and one-half to nine months after banding, were taken within twenty miles of their birthplaces; a Long-eared Owl had traveled fifty miles in eight months; a Western Red-tailed Hawk, banded May 4, 1928, was taken on July 5, 1928, about 250 miles northwest of the place of banding.—J. B. M.

Manual for Bird Banders. By Frederick C. Lincoln and S. Prentiss Baldwin. United States Department of Agriculture, Miscellaneous Publication No. 58. Washington, November, 1929.

This much-desired instruction book will meet a long-felt want among bird-banders and it is filled with a wealth of valuable material. After a brief historical review of banding in America, the subject is treated under the various headings of traps for small-bird stations, nest traps, special traps and methods, traps for waterfowl, other trapping equipment, bait, operation of traps, handling captured birds, bands, records, problems that trapping-station operators may solve, literature, and ornithological organizations. There are many excellent illustrations of traps, etc., though we are sorry to see that Figure 63 advocates the "head-hold" in changing a bird's position while banding. Although many birds remain quiescent when so handled, woodpeckers and some other species struggle violently, in our experience.

Under the heading of "problems" many suggestions are made as to studies of migration, territorial habits, dispersal of young, ecological preferences, family groups, "permanent residents" of a locality, mating activities, plumage changes, weights and measurements, temperature studies, diseases and parasites, length of life, and individual peculiarities or personalities. Other phases of bird-study by banding and related methods will undoubtedly develop as the work progresses, but every bander should read carefully this excellent little manual.—J. B. M.

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